AC Power
For *Business-Critical Continuity™*

Liebert® NXL™ Maintenance Bypass Cabinet

Installation Manual — 250-400kVA, 60Hz

EMERSON
Network Power

CONTACTING LIEBERT FOR SUPPORT

To contact Emerson Network Power Liebert Services for information or repair service in the United States, call 1-800-LIEBERT (1-800-543-2378). Liebert Services offers a complete range of start-up services, repair services, preventive maintenance plans and service contracts.

For repair or maintenance service outside the 48 contiguous United States, contact Liebert Services, if available in your area. For areas not covered by Liebert Services, the authorized distributor is responsible for providing qualified, factory-authorized service.

For Liebert Services to assist you promptly, have the following information available:

Part Numbers: _____

Serial Numbers: _____

kVA Rating: _____

Date Purchased: _____

Date Installed: _____

Location: _____

Input Voltage/Frequency: _____

Output Voltage/Frequency: _____

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SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation of your Liebert NXL™ Maintenance Bypass Cabinet.

WARNING

Exercise extreme care when handling cabinets to avoid equipment damage or injury to personnel. The Liebert NXL Maintenance Bypass Cabinet weight ranges from 700 to 755 lb (317 to 342kg).

Locate center of gravity symbols and determine unit weight before handling each cabinet. Test lift and balance the cabinets before transporting. Maintain minimum tilt from vertical at all times.

Slots at the base of the cabinets are intended for forklift use. Base slots will support the unit only if the forks are completely beneath the unit.

In case of fire involving electrical equipment, use only carbon dioxide fire extinguishers or those approved for use in fighting electrical fires.

Extreme caution is required when performing maintenance.

Be constantly aware that the system contains high DC as well as AC voltages.

Check for voltage with both AC and DC voltmeters prior to making contact.

Read this manual thoroughly before working with the maintenance bypass cabinet. Retain this manual for use by installing personnel.

WARNING

Under typical operation and with all doors closed, only normal safety precautions are necessary. The area around the system should be kept free of puddles of water, excess moisture and debris.

Special safety precautions are required for procedures involving handling, installation and maintenance of the Maintenance Bypass Cabinet. Observe all safety precautions in this manual before handling or installing the Maintenance Bypass Cabinet. Observe all precautions in the Operation and Maintenance Manual, before as well as during performance of all maintenance procedures.

This equipment contains circuits that are energized with high voltage. Only test equipment designed for troubleshooting should be used. This is particularly true for oscilloscopes. Always check with an AC and DC voltmeter to ensure safety before making contact or using tools. Even when the power is turned Off, dangerously high potential electric charges may exist.

All power and control wiring should be installed by a qualified electrician. All power and control wiring must comply with the NEC and applicable local codes.

ONLY properly trained and qualified personnel should perform maintenance on the Maintenance Bypass Cabinet. When performing maintenance with any part of the equipment under power, service personnel and test equipment should be standing on rubber mats. The service personnel should wear insulating shoes for isolation from direct contact with the floor ground.).

One person should never work alone, even if all power is removed from the equipment. A second person should be standing by to assist and summon help in case of an accident.

CAUTION

This unit complies with the limits for a Class A digital device, pursuant to Part 15 Subpart J of the FCC rules. These limits provide reasonable protection against harmful interference in a commercial environment. This unit generates, uses and radiates radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this unit in a residential area may cause harmful interference that the user must correct at his own expense.

NOTE

Liebert Corporation neither recommends nor knowingly sells this product for use with life support or other FDA-designated "critical" devices.

1.0 SINGLE-MODULE MECHANICAL INSTALLATION

1.1 Introduction

This section describes the requirements that must be taken into account when planning the positioning and cabling of the Liebert NXL Maintenance Bypass Cabinet.

This chapter is a guide to general procedures and practices that should be observed by the installing engineer. The particular conditions of each site will determine the applicability of such procedures.

WARNING

Do not apply electrical power to the UPS equipment before the arrival of the commissioning engineer.

WARNING

The Maintenance Bypass Cabinet should be installed by a qualified engineer in accordance with the information contained in this chapter and all equipment not referred to this manual is shipped with details of its own mechanical and electrical installation.

WARNING

Eye protection should be worn to prevent injury from accidental electrical arcs. Remove rings, watches and all metal objects. Only use tools with insulated handles. Wear rubber gloves.

1.2 Preliminary Checks

Before installing the Maintenance Bypass Cabinet, carry out the following preliminary checks:

- Visually examine the equipment for transit damage, both internally and externally. Report any damage to the shipper immediately.
- Verify that the correct equipment is being installed. The equipment supplied has an identification tag on the back of the main door reporting: the type, size and main calibration parameters of the UPS.
- Verify that the room satisfies the environmental conditions stipulated in the equipment specifications, paying particular attention to the ambient temperature and air exchange system.

1.3 Environmental Considerations

1.3.1 Room

The Maintenance Bypass Cabinet is intended for indoor installation and should be located in a cool, dry, clean-air environment with adequate ventilation to keep the ambient temperature within the specified operating range (see **3.0 - Specifications**).

All models of the Liebert NXL Maintenance Bypass Cabinet are convection-cooled. To permit air to enter and exit and prevent overheating or malfunctioning, do not cover the ventilation openings.

When bottom entry is used, the conduit plate must be installed. If necessary to cool the room, install a system of room extractor fans.

NOTE

The Maintenance Bypass Cabinet is suitable for mounting on concrete or other non-combustible surface only.

1.3.2 Storage

Should the equipment not be installed immediately, it must be stored in a room for protection against excessive humidity and or heat sources (see **Table 1**).

1.4 Positioning

The cabinet is structurally designed to handle lifting from the base.

Access to the power terminals, auxiliary terminals blocks and power switches is from the front.

The top and front removable panels are secured to the chassis by screws. The door can be opened to give access to the power connections bars, auxiliary terminal blocks and power isolators. Front door can be opened at 180° for better Service and more flexibility in installations.

1.4.1 Moving the Cabinets

The route to be travelled between the point of arrival and the unit's position must be planned to make sure that all passages are wide enough for the unit and that floors are capable of supporting its weight (for instance, check that doorways, lifts, ramps, etc. are adequate and that there are no impassable corners or changes in the level of corridors).

Ensure that the cabinet weight is within the designated surface weight loading (kg/cm^2) of any handling equipment. See **Table 1** for weight.

Ensure that any lifting equipment used in moving the cabinet has sufficient lifting capacity.

The Maintenance Bypass Cabinet can be handled by means of a fork lift or similar equipment. For operations with a fork lift, refer to installation drawings in **2.0 - Installation Drawings**.

Because the weight distribution in the cabinet is uneven, use extreme care during handling and transporting.

When moving the unit by forklift, care must be taken to protect the panels. Do not exceed a 15-degree tilt with the forklift. Bottom structure will support the unit only if the forks are completely beneath the unit.

Handling with straps is not authorized.

CAUTION

Take extreme care when handling Maintenance Bypass Cabinets to avoid equipment damage or injury to personnel.

1.4.2 Clearances

Liebert NXL Maintenance Bypass Cabinets have no ventilation grilles at either side or at the rear. Clearance around the front of the equipment should be sufficient to enable free passage of personnel with the doors fully opened. It is important to leave a distance of 24" (610mm) between the top of the cabinet and any overhead obstacles to permit adequate circulation of air coming out of the unit.

1.4.3 Floor Installation/Anchoring

The installation diagrams in **2.0 - Installation Drawings** of this manual identify the location of the holes in the base plate through which the equipment can be bolted to the floor. If the equipment is to be located on a raised floor it should be mounted on a pedestal suitably designed to accept the equipment point loading. Refer to the base view to design this pedestal.

1.5 Cable Entry

Cables can enter the Maintenance Bypass Cabinet from the bottom or top.

1.6 Power Cables

The Maintenance Bypass Cabinet requires both power and control cabling once it has been mechanically installed. All control cables must be separate from the power cables. Run control cables in metal conduits or metal ducts that are electrically bonded to the cabinets they are connected to.

The cable design must comply with the voltages and currents provided in **Tables 2** and **3**, follow local wiring practices and take into consideration the environmental conditions (temperature and physical support media).

For cable entry terminal, refer to **Figure 7**.

WARNING

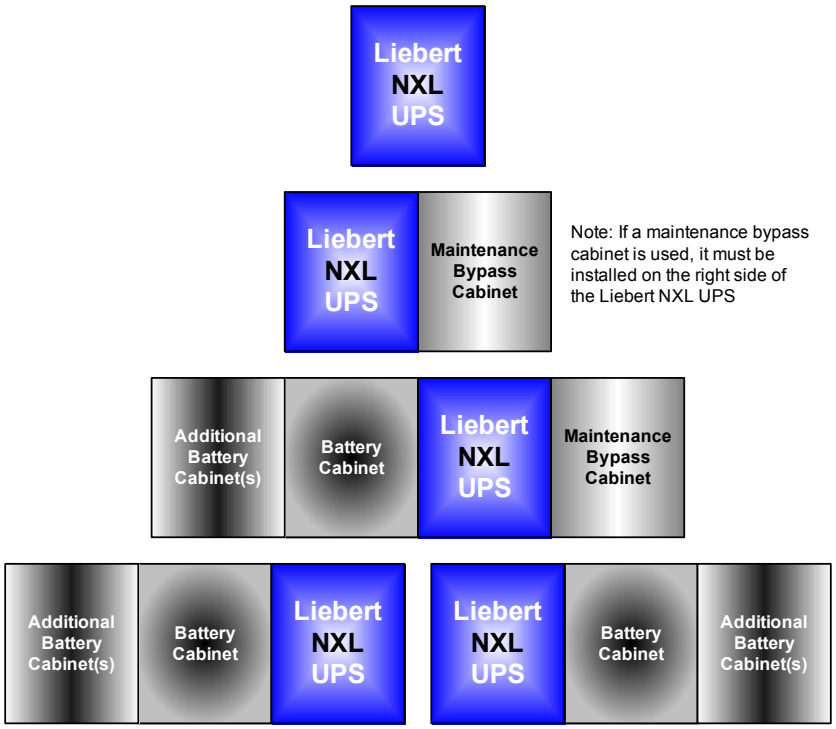
Before cabling up the cabinet, ensure that you are aware of the location and operation of the external isolators that connect the input/bypass supply.

Check that these supplies are electrically isolated, and post any necessary warning signs to prevent their inadvertent operation.

The following are guidelines only and superseded by local regulations and codes of practice where applicable:

- Take special care when determining the size of the neutral cable (grounded conductor), because current circulating on the neutral cable may be greater than nominal current in the case of non-linear loads. Refer to **Tables 2** and **3**.
- The grounding conductor should be sized according to the fault rating, cable lengths, type of protection, etc. The grounding cable connecting the UPS to the main ground system must follow the most direct route possible.
- Consider using smaller, paralleled cables for heavy currents as a way of easing installation.

Figure 1 Cabinet arrangement—Liebert NXL UPS, battery cabinets, maintenance bypass cabinet


Liebert NXL UPS
Liebert NXL UPS
Maintenance Bypass Cabinet
Note: If a maintenance bypass cabinet is used, it must be installed on the right side of the Liebert NXL UPS
Additional Battery Cabinet(s)
Battery Cabinet
Liebert NXL UPS
Maintenance Bypass Cabinet
Additional Battery Cabinet(s)
Battery Cabinet
Liebert NXL UPS
Liebert NXL UPS
Battery Cabinet
Additional Battery Cabinet(s)

1.6.1 Power Cable Connection Procedure

The system input, UPS bypass, UPS output and system output cables (all require lug type terminations) are connected to busbars situated behind the power isolator switches as shown in **2.0 - Installation Drawings**. These are accessible when the power compartment door is opened.

Equipment Ground

The equipment ground busbar is located near the input and output power supply connections as shown in **2.0 - Installation Drawings**. The grounding conductor must be connected to the ground busbar.

All cabinets and cable trunking should be grounded in accordance with local regulations.

WARNING

Failure to follow adequate grounding procedures can result in electric shock hazard to personnel, or the risk of fire, should an ground fault occur.

WARNING

The operations described in this section must be performed by authorized electricians or qualified technical personnel. If you have any difficulties, do not hesitate to contact Emerson Network Power Liebert Services. See the back page of this manual for contact information.

NOTE

Proper grounding considerably reduces problems in systems caused by electromagnetic interference.

Once the equipment has been finally positioned and secured, connect the power cables as described in the following procedure.

Refer to the appropriate cable connection drawing in **2.0 - Installation Drawings**.

1. Verify that the bypass equipment is isolated from its external power source and all the power isolators are open. Check that these supplies are electrically isolated and post any necessary warning signs to prevent their inadvertent operation.
2. Open the door to the cabinet.
3. Connect the ground and any necessary main bonding jumper to the equipment ground busbar.

NOTE

The grounding and neutral bonding arrangement must be in accordance with local and national codes of practice.

4. Connect the AC input supply cables between the power distribution panel and the bypass input supply busbars (A-B-C terminals) and tighten the connections to the proper torque.
   Ensure correct phase rotation!
5. Connect the AC input supply cables between the maintenance bypass cabinet and the UPS bypass input supply busbars (A-B-C-N terminals) and tighten the connections to the proper torque.
   Ensure correct phase rotation!
6. Connect the system output power cables between the Maintenance Bypass Cabinet output (A-B-C-N terminals) and the critical load and tighten the connections to the proper torque.
   Ensure correct phase rotation!
7. Connect the auxiliary cables of any external interface/signals to the respective connections of the output auxiliary terminal block (X4) (see **2.0 - Installation Drawings**).
8. Close the interior door.

2.0 INSTALLATION DRAWINGS

Figure 2 Two Breaker Maintenance Bypass Cabinet, two input, attached

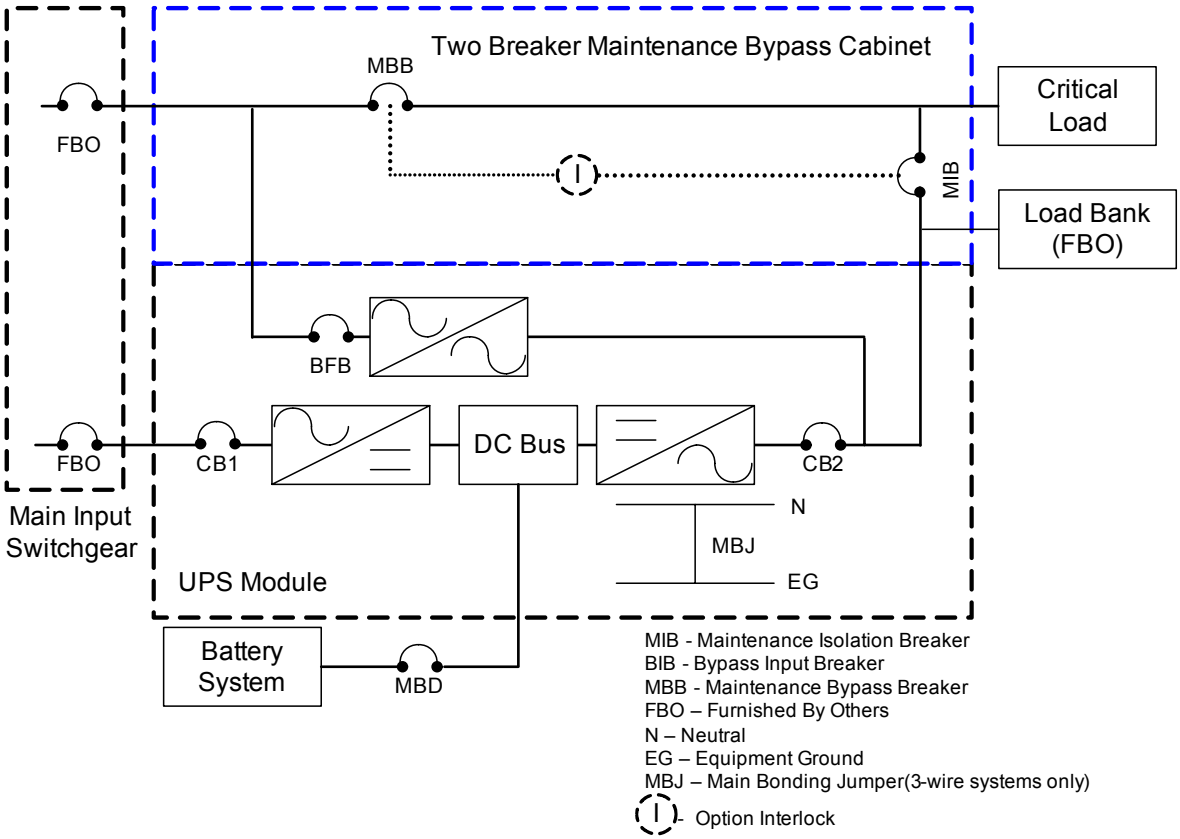


Figure 3 Two Breaker Maintenance Bypass Cabinet, three input, attached or detached

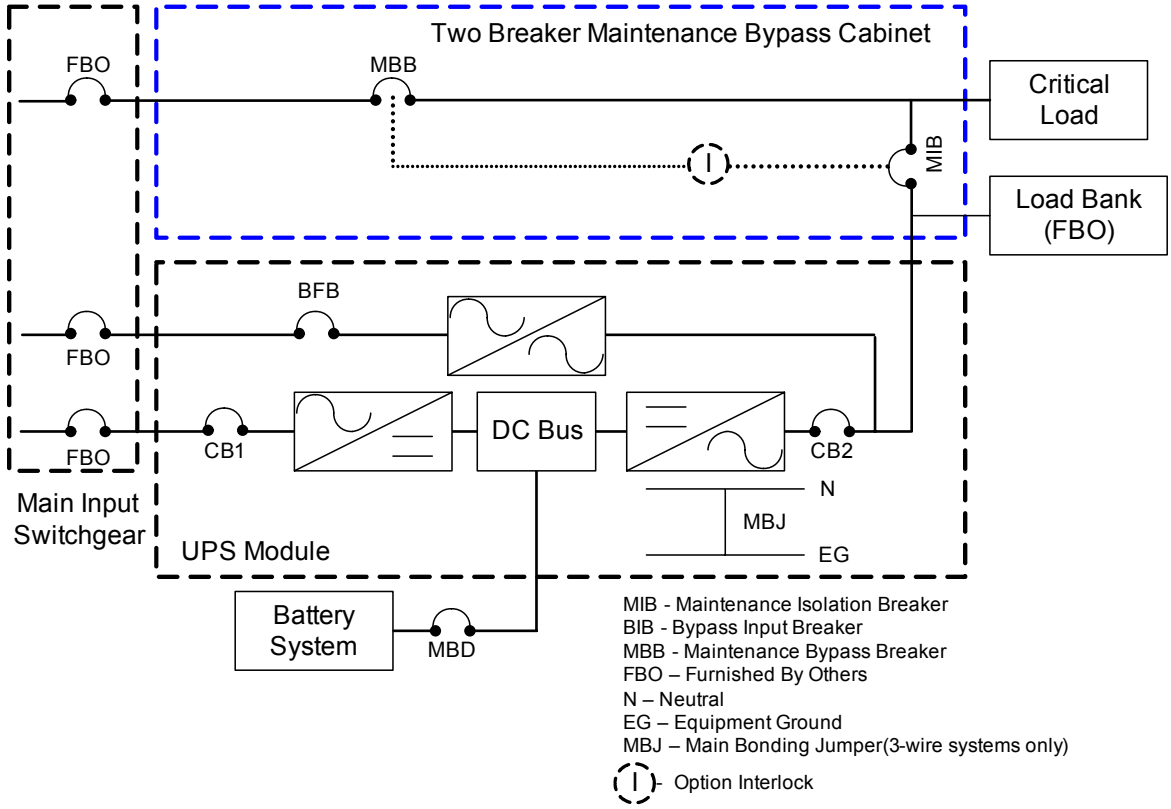


Figure 4 Two Breaker Maintenance Bypass Cabinet, one input, attached

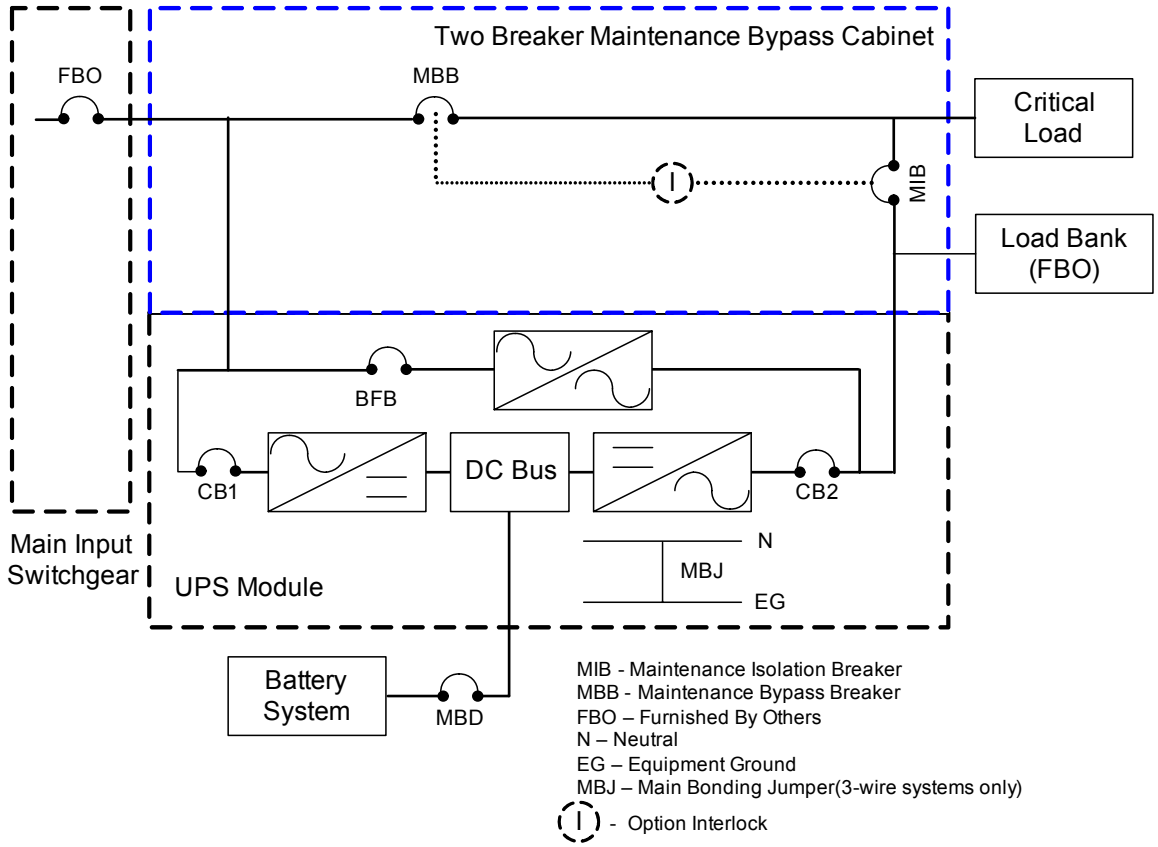


Figure 5 Liebert NXL Maintenance Bypass Cabinet—main components location

Figure 6 Liebert NXL Maintenance Bypass Cabinet—outline Drawing

Figure 7 Liebert NXL Maintenance Bypass Cabinet—terminal details

Figure 8 Liebert NXL Maintenance Bypass Cabinet Control wire diagram

Figure 9 Liebert NXL Maintenance Bypass Cabinet Control wire routing

3.0 SPECIFICATIONS

Table 1 Liebert NXL Maintenance Bypass Cabinet specifications

Model Size	250	300	400
Input Parameters			
Input Voltage to Bypass, VAC	480V 3-phase, 3-wire or 4-wire		
Permissible Input Voltage Range, VAC	70% to 110%		
Input Frequency, Hz	60		
Permissible Input Frequency Range, Hz	55 to 65		
Neutral Current	1.7 times full phase current		
Output Parameters			
Inverter Type	IGBT-based Sine-Sine PWM Controlled		
Output Power, kW	225	270	360
Output Voltage, VAC	480V 3-ph, 4-w		
Output Frequency, Hz	60		
Physical Parameters & Standards, in (mm)			
Width in. (mm) with side panels attached	30.9 (785)		
Depth in. (mm)	33.5 (850)		
Height in. (mm)	76.8 (1950)		
Weight, lb (kg)	755 (342.5)		
Color	Charcoal (ZP-0420)		
Front Door Opening (for serviceability)	More than 180°		
Degree of Protection for UPS Enclosure	IP 20 (with and without front door open)		
Standards and Conformities	UL 1778 CSA 22.2 107.3 FCC Part 15, Class A STA Procedure 1H WEEE		
Minimum clearance, Top, in (mm)	24 (610)		
Minimum clearance, Back, in (mm)	0		
Minimum clearance, Sides, in (mm)	0		
Location of cable entrance	Top or Bottom		
Environmental Parameters			
Storage Temperature Range, °F (°C)	-13 to 158 (-25 to 70)		
Operating Temperature Range, °F (°C)	0 to 40 (UPS) 1.5% maximum kW derate / °C up to 122 (50) 122 (50) absolute maximum with derating		
Relative Humidity	Maximum 95% Non-Condensing (Operating and Non-Operating)		
Maximum Altitude above MSL, ft (m)	4920 (1500) (as per IEC 62040/3) - 1% maximum kW derate / 328 rise between 4921-9843 (100m rise between 1500-3000m0		

Table 2 Liebert NXL Maintenance Bypass Cabinet current ratings—system input

UPS Rating		Voltage (VAC)			System Input		
kVA	kW	Input	Bypass	Output	Nominal Current	10 Minute Overload	External Breaker Trip, Amps
250	225	480	480	480	301	376	400
300	270	480	480	480	361	451	500
400	360	480	480	480	481	601	700

Table 3 Liebert NXL Maintenance Bypass Cabinet current ratings—system output

UPS Rating		Voltage, VAC			System Output		
kVA	kW	Input	Bypass	Output	Nominal Current	10 Minute Overload	External Breaker Trip, Amps
250	225	480	480	480	301	376	400
300	270	480	480	480	361	451	500
400	360	480	480	480	481	601	700

Table 4 Recommended conduit and cable sizes

UPS Rating		System Input Voltage (VAC)				Nominal Selection		Alternate Selection	
kVA	kW	Rectifier	Bypass	Maint. Bypass	Output	Top Cable Entry Wire & Conduit Ph, N, G THW / FMC	Bottom Cable Entry Wire & Conduit Ph, N, G THW / RNC	Top Cable Entry Wire & Conduit Ph, N, G THW / FMC	Bottom Cable Entry Wire & Conduit Ph, N, G THW / RNC
250	225	480	480	480	480	(2) 3C 3-250kcmil, 2-#4/0AWG, #1/0AWG	(2) 3C 3-250kcmil, 2-#4/0AWG, #1/0AWG	(3) 2.5C 3-#2/0AWG, 2-#1/0AWG, #1/0AWG	(3) 3C 3-#2/0AWG, 2-#1/0AWG, #1/0AWG
300	270	480	480	480	480	(2) 3C 3-350kcmil, 2-#4/0AWG, #1/0AWG	(2) 3.5C 3-350kcmil, 2-#4/0AWG, #1/0AWG	(3) 2.5C 3-#4/0AWG, 2-#1/0AWG, #1/0AWG	(3) 3C 3-#4/0AWG, 2-#1/0AWG, #1/0AWG
400	360	480	480	480	480	(2) 3.5C 3-500kcmil, 2-350kcmil, #1/0AWG	(2) 4C 3-500kcmil, 2-350kcmil, #1/0AWG	(3) 3C 3-250kcmil, 2-#4/0AWG, #1/0AWG	(3) 3C 3-250kcmil, 2-#4/0AWG, #1/0AWG
500	450	480	480	480	480	(3) 3.5C 3-500kcmil, 2-250kcmil, #1/0AWG	(3) 4C 3-500kcmil, 2-250kcmil, #1/0AWG	(4) 3C 3-250kcmil, 2-#4/0AWG, #1/0AWG	(3) 3C 3-250kcmil, 2-#4/0AWG, #1/0AWG

Notes

See the Liebert NXL UPS installation manual, SL-25420, for UPS rectifier, UPS bypass and UPS output sizes. The manual is available at the Liebert Web site: **www.liebert.com**

These are guidelines only and are superseded by local regulations and codes of practice where applicable.

- Take special care when determining the size of the neutral cable, as current circulating on the neutral cable may be greater than nominal current in the case of non-linear loads. Refer to the values given in the **Tables 2** and **3**.
- The ground conductor should be sized according to the fault rating, cable lengths, type of protection, etc. The ground cable connecting the UPS to the main ground system must follow the most direct route possible.
- Consideration should be given to the use of smaller, paralleled cables for heavy currents, as a way to ease installation.
- In most installations, the load equipment is connected to a distribution network of individually protected busbars fed by the maintenance bypass cabinet output rather than being connected directly to the Maintenance bypass cabinet itself. Where this is the case, the maintenance bypass cabinet output cables can be rated to suit the individual distribution network demands rather than being fully load-rated.
- When laying the power cables, do not form coils to avoid increasing formation of electromagnetic interference.

Ensuring The High Availability 0f Mission-Critical Data And Applications.

Emerson Network Power, the global leader in enabling business-critical continuity, ensures network resiliency and adaptability through a family of technologies—including Liebert power and cooling technologies—that protect and support business-critical systems. Liebert solutions employ an adaptive architecture that responds to changes in criticality, density and capacity. Enterprises benefit from greater IT system availability, operational flexibility and reduced capital equipment and operating costs.

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